general aspect most resembles), *H. parsoni*, and *H. rainbirdi*, having the flat base and large umbilicus of the last, and the large globosely conical form of the first, but with an absence of the characteristic margin of it and of *H. parsoni*.

BULIMUS (EUMECOSTYLUS) SCOTTII, sp. nov.

Shell rimate, solid, oblong, conical, longitudinally coarsely streaked, and transversely striated with irregular, coarse, undulating striæ, which become finer towards the apex; dark yellow-brown, lighter at the apex; spire conical; whorls 6, the last exceeding the spire in length; suture margined with white below; aperture auriform, oblong; peristome thickened, white, moderately expanded; columella dilated, with a strong flat tortuous plait entering the aperture, between which and the insertion of the upper margin of the aperture is a strong blunt callous tooth; margins of the aperture joined by a thick white callus.

Length 2·10, breadth 1·00; length of aperture 1·18 inch.

Hab. Solomon Islands.

In the collection of Mr. W. W. Hargraves, Sydney.

This species has the general aspect of *B. macgillivrayi*, but may be easily distinguished by its white mouth and coarse transversely undulating striæ.

DESCRIPTION OF PLATE XVI.

Fig. 1. *Helix (Discus) cerealis*, p. 147.
2. —— *(Camæna) barneyi*, p. 148.
3 *a*, 3 *b*. *Helix yatalaensis*, p. 149.
4 *a*, 4 *b*. —— *fatigata*, p. 149.
5 *a*, 5 *b*. —— *(Geotrochus) gelata*, p. 149.
6. *Helix (Geotrochus) zelina*, p. 150.
7 *a*, 7 *b*. *Helicarion hilli*, p. 151.

February 4, 1873.

Professor Huxley, F.R.S., V.P., in the Chair.

The following letter, addressed to the Secretary by the Rev. S. J. Whitmee, C.M.Z.S., was read:—

"Samoa, South Pacific, Nov. 8th, 1872.

"MY DEAR SIR,—Your letter of April 9th reached me a week or two since. I have no *Didunculi* by me at the present time. There are two living birds in the possession of natives; but they ask very high prices, £10 each! I think I shall be able to purchase some before long at a reasonable rate, when the natives find prices formerly given are not now to be obtained.

"I have a *Porphyrio indicus*, two specimens of a fruit-eating Pigeon of the Pacific, three of the *Ptilonopus fasciatus* (Peale), and another

Dove of the name of which I am not sure; and these I am now sending to the care of Dr. Bennett, of Sydney, for the Society. I have had all these birds in captivity for some months, and they thrive well.

"The *Ptilonopus fasciatus* is a favourite bird with the natives of these islands, and is kept very generally by them. Its native name is *Manu-tagi* (the crying bird). The Samoans train it to act as a decoy, and take it into the woods in a wicker cage open at the top. When it calls, other birds come to it and enter the cage, when they are taken by the native, who lies hidden near the spot. The birds thus taken are eaten by the natives. But this custom of decoying is going out now, in consequence of the ease with which the birds may be shot. The *Ptilonopus perousii* is a most beautiful bird; but it is useless trying to send it to England: it lives for a very short time in captivity, even in Samoa.

"If you wish any particular birds or other animals which at any time I can send to the Society, I shall always do my best to meet your wishes.

"Yours very sincerely,
"S. J. Whitmee."

A communication was read from Mr. Henry W. Piers, late Acting Curator of the South-African Museum, Cape-town, containing a description of the external form of *Chimæra australis*.

Mr. E. Blyth, C.M.Z.S., made remarks on some Tiger-skins (*Felis tigris*) from India, Siam, and Siberia, lent for exhibition by Mr. Edwin Ward, F.Z.S.

The following papers were read:—

1. On a certain Class of Cases of Variable Protective Colouring in Insects. By Raphael Meldola, F.C.S., M.Ent. Soc.Lond. (Communicated by A. G. Butler, F.L.S., F.Z.S., &c.)

[Received November 19, 1872.]

Among the many classes of biological phenomena that received explanation on the appearance of the 'Origin of Species' in 1859, the principle of *disguise*, as it exists in most classes of the animal kingdom, but more especially in the Insecta, is one of great interest to the naturalist. In 1861 Mr. H. W. Bates, in an admirable memoir on the Lepidoptera of the Amazon Valley*, first demonstrated the identity of the causes concerned in the production of what are known as *protective resemblances*, and of those wonderful mimetic analogies of which he had discovered so many examples among the insects of that region, and which subsequent research has shown to exist in all tropical countries. That these causes were found in the principles of variation and heredity, a struggle for life and the

* Trans. Linn. Soc. vol. xxiii. p. 495.

"survival of the fittest," it is perhaps scarcely necessary to add. Notwithstanding this identity of origin, I would venture to suggest the propriety of confining the application of the word "mimicry" to such cases as those to which it was first applied by Mr. Bates—to those, viz., in which the object imitated is *animate*; while the expression "protective resemblance" should be restricted to those cases in which the object simulated is inanimate or part of a vegetable structure. This distinction is, I am persuaded, well adapted to prevent that confusion of ideas which is apt to arise when the term "mimicry" is used in the sense in which it has been recently used by Dr. Hagen, whose paper, designated "Mimicry in the Colour of Insects"*, contains in reality no cases of mimicry at all †. The distinction here enforced was adopted by Mr. A. R. Wallace in his well-known essay published in the 'Westminster Review' for July 1867, but it appears to have been neglected by most subsequent writers on the subject.

Classification of the cases of protective resemblance.

In every case of protective resemblance the disguised species simulates some object in the environment; and as the object thus imitated may be of a nature either constant or variable, we are obviously provided with a means of classifying the cases of protective resemblance, though but imperfectly, according to the stability of the characters of the imitated object. As the result of an attempt to arrange the cases of protective resemblance according to this system, I have found it necessary to erect the four following classes, which include, so far as I know, all the known cases, with the exception of a certain small group which will be considered hereafter:—

I. Cases in which both the characters of the imitated object and the disguising characters of the species remain constant during the lifetime of each individual.

This class includes a very large proportion of the known cases of protective resemblance, and passes by small gradations into Class II. Most of those instances in which there is mere harmony of colouring between a species and its environment belong to this class.

II. Cases in which the imitated object varies within certain small

* 'American Naturalist' for July 1872.

† It will be well here again to insist upon the fact, previously insisted upon by Mr. Wallace, that the word *mimicry* is not to be understood in the sense of voluntary imitation. It is true that in many cases the mimicker copies its model in mode of flight or other habits; but even here the imitation cannot be considered voluntary, since such modification of habit has most probably arisen by the natural selection, through many generations, of individuals whose manner of flight resembled in any way the manner of flight of the imitated species—just in the same way as this agency, selecting through many generations those individuals whose colour, form, pattern, &c. approached in any way the colour, form, or pattern of the imitated species, has at length brought about the close resemblance in external characters which we now behold: in other words, along with the *structural* there has gone on a *psychical* mimetic adaptation.

limits, the species presenting a corresponding range of variation in its disguising characters.

In illustration of this class I may mention the "leaf-butterflies" (*Kallima paralekta* and *K. inachis*), as also some of the true "leaf-insects" (*Phasmidæ*). The objects here imitated are leaves in various stages of decay; and as these are of variable hues, the insects present varieties of corresponding shades of colour.

III. Cases in which the imitated object undergoes a change of character *once* during the lifetime of the individual, whose disguise changes in correspondence.

In illustration of this class I will name the larvæ of two of our native Geometræ, viz. *Geometra papilionaria* and *Acidalia degeneraria*, the former of which is dull purplish before hibernation, but becomes green in the spring; while the latter, from the period of its emergence from the egg in July to the middle of September, is of a greenish-brown colour, but changes to a rusty brown at this period preparatory to hibernation *.

It is obvious that a change of habit in the species entailing a new relationship with the environment is equivalent to a change of character in the environment itself. In this class therefore I include such larvæ as those of *Thecla betulæ*, the genera *Smerinthus* and *Sphinx*, *Macaria alternata*, &c., which are green when feeding on their respective food-plants, but become brown previous to pupation, at which period the insects require to crawl over the ground to find a suitable burying-place.

IV. Cases in which the colour of the imitated object undergoes *periodic* change, the protective characters of the species changing in correspondence.

This class includes those cases in which, like the Alpine Hare, the Ermine, and the Ptarmigan, the disguising characters change with the season.

In concluding this classification I would call attention to the manner in which the characters of the imitated object and the disguising characters of the species vary together. The truth thus brought to light I hope to fully investigate in a future paper.

Variable protective colouring.

I have already had occasion to mention that there existed a certain number of cases that could not be included in any class of the above arrangement; it is to these residual instances that I would wish to direct the attention of naturalists in the present paper, as their study offers a wide and interesting field for observation. The particular class of cases that I propose to include under the term "variable protective colouring" will be best understood from the following examples which I have collected from various sources.

First, with reference to insects in the larval state. Fabricius

* See the recently published description of this larva by Mr. William Buckler, of Emsworth, 'Entom. Monthly Mag.' Oct. 1872, p. 115. A somewhat similar change of colour is recorded in the larva of *Gnophos obscurata* by Mr. Hellins, *l. c.* June 1871, p. 20.

long ago observed that the larva of *Bryophila algæ* varied in colour according to the nature of its food-plant, being yellow when feeding on *Lichen juniperinus*, and grey when on *L. saxatilis*. Dr. Möller in 1867 published a paper containing a great number of observations on the influence exerted by external conditions upon insects *. Two of these, which belong actually to our present class, I will here quote.

The ground-colour of the larva of *Cucullia tanaceti* is white when this insect is feeding on the leaves of the mugwort (*Artemisia vulgaris*) or tansy (*Tanacetum vulgare*), but changes to a yellow when it confines itself to the flowers of the latter. The larva of *Chesias spartiata* is stated by Koch to present two varieties—one of a green colour, that feeds on the leaves of broom (*Spartium scoparium*), and another of a yellow colour, that feeds on the flowers of that plant. This observation has been subsequently confirmed by Mr. William Buckler †. The larva of *Cleora lichenaria*, which is well known to be a wonderful case of adaptation to the lichen on which it feeds, is stated by Dr. Knaggs ‡ to vary in depth of colour according as it occurs on light- or dark-coloured lichen. Many polyphagous caterpillars of the genus *Eupithecia* tend to assume the colour of the flower on which they are feeding: this is particularly to be observed in *E. absynthiata*; and, in a recently published description of the larva of *E. pimpinellata*, which feeds on the seeds of *Pimpinella magna* and *P. saxifraga*, it is stated that "the colour of the larva seems to assimilate with the seeds—green ones upon green unripe seeds, and the red ones upon the purple ripe seeds" §. I have likewise observed a similar tendency in the larva of *Mamestra persicariæ* to partake of the tint of the leaf on which it was feeding.

The experiments of Mr. T. W. Wood ‖ and others seem to establish the fact that under certain conditions the pupæ of Lepidoptera tend to assume the colour of the surface on which the larva made its final change. Mr. Wood has observed, for instance, that a pupa of *Vanessa polychloros* was coloured like a dead leaf when among foliage, while a specimen from a wall was mottled grey. I have observed a similar fact with respect to the pupæ of *Synchloë brassicæ* and *S. rapæ*, specimens from a black fence being generally darker than those found on walls. The particular conditions under which this photographic sensitiveness is acquired have not yet been fully investigated; but such a tendency in a state of nature cannot but act beneficially towards the species by affording concealment; I therefore propose to include such cases in the class now under consideration.

With reference to insects in the perfect state, I am informed by Mr. F. Bond that *Gnophos obscurata* tends to vary in its ground-

* Die Abhängigkeit der Insecten von ihrer Umgebung.

† Entom. Monthly Mag. April 1871, p. 261.

‡ Lepidopterist's Guide, new ed. p. 47.

§ Mr. William Prest in 'Newman's Entomologist,' Nov. 1872, p. 241.

‖ Proc. Ent. Soc. of Lond. 1867, p. xcix.

colour in correspondence with the prevailing tint of its district, being light when from chalk, dark from peat, and reddish brown from clay. Similarly, Dr. Möller, in the paper before referred to, has recorded that *Elaphrus riparius* is of a brown colour when in sandy districts, but is green when in meadow-lands. The African *Eremiaphila*, described by M. Lefebvre *, furnishes an excellent example of the class now under consideration. This desert-insect is described as having perfect identity of colour with the ground on which it lives, and is stated to vary in colour from brown to silvery white, according to the colour of the soil on which it occurs. One remarkable case recorded by Dr. Wallace belongs perhaps to the present class. Referring to *Bombyx cynthia*, the author observes †:—"The earliest bred specimens were of a predominant olive-green ground-colour, whereas the later bred, and especially those that escaped from pupæ in September, not having passed a winter in cocoon, were of a predominant yellow tint. . . . Exceptions of course occur to this rule, but they are very few. It is hardly necessary to observe that these tints closely resembled the shades of the Ailanthus-leaflets, which assume a yellower tint as the season advances and the leaflets grow older."

Although insects furnish the largest number of cases of "variable protective colouring," examples are not wanting in other classes of the animal kingdom. Thus among Crustacea the Chameleon Shrimp (*Mysis chamæleon*) has been so named from its power of changing colour according to the locality which it inhabits, being grey on sand, brown among seaweeds, and green when among *Ulva* and *Zostera*. It is well known that many species of fish, especially of the family *Pleuronectidæ*, are capable of changing colour in correspondence with the colour of the bank on which they are resting or the water which they inhabit ‡. It is stated by Mr. Andrew Murray, also, that various birds are capable of undergoing a similar, though more permanent, alteration in colour §.

Definition of variable protective colouring.

The class of cases of which I have just given examples I propose to group together in a fifth class of the above-given classification, which, with this addition, is thus made to embrace all the known cases of protective resemblance. It will therefore become necessary to find a definition, as precise as the materials will permit, of the

* Ann. Soc. Ent. de France, iv. p. 455.

† Trans. Ent. Soc. vol. v. p. 485.

‡ See, for instance, Yarrell on the Flounder, Brit. Fishes, 2nd ed. p. 304; also Mr. Andrew Murray's paper on the "Disguises of Nature," Edinburgh New Philos. Journ., Jan. 1860; and Prof. Cope on "The Method of Creation of Organic Forms," Proc. Amer. Philos. Soc. vol. xii. 1871, p. 260. My friend the late Mr. J. K. Lord, of the Brighton Aquarium, confirmed this statement with regard to the *Pleuronectidæ*.

§ *Loc. cit.* p. 11. The species cited are the Grouse and Partridge: the former are stated to be very light brown in the low corn districts, so as to match the stubble; while the Moor-Partridges, which frequent the heather, are said to be darker than those of the lowlands.

present class; and this definition will be best found by comparing the present class with the above-given classes, and noting in what points they differ. Now, of the four classes already named, Class II. makes the nearest approach to the class now under consideration. The cases of Class II. are indeed, to a certain extent, cases of "variable protective colouring;" it becomes necessary, therefore, to draw a sharp line of demarcation between these two classes; and for this purpose I will take a known instance belonging to Class II. and trace it through the hypothetical conditions necessary to make it a member of Class V. The example given is from a paper "On the Adaptive Colouring of the Mollusca," by Mr. Edward S. Morse*.

The shell of a common coast species of *Littorina* presents two varieties, one of an olive-brown and the other of a yellowish colour, these two forms corresponding in colour to the bulbous portion of the bladder-weed on which the shell swarms, and which is olive-brown or yellow according to age. Now if we imagine that, instead of the brown and yellow bladders being borne on the *same* plant, they were borne on *different* plants, and that the two forms of the shell were always limited to the plants of their own colour, we should then refer the case to the present class.

Thus in Class II. the conditions to be met are the same, or very nearly the same, for each individual of the species; whereas in Class V. the object imitated may differ in character for each individual of the species; and this can obviously only be met by *a power of adaptability* on the part of each individual. In other words, in Class II. it is the *aggregate* of individuals that is adapted to the surrounding conditions, while in the present class *each particular individual* is capable of being adapted to the characters of its environment.

It is obviously quite unnecessary to draw any distinction between the cases of Class I. and the cases of the present class, since there is no possibility of a confusion arising between these two groups. On referring to the examples above given in illustration of Classes III. and IV. it will be seen that the characters of the imitated object change once in the course of time in Class III., and periodically in Class IV. The imitated object, as it exists in space, may in these two classes be either constant or variable. In Class V., on the contrary, the characters of the imitated object, while either constant or variable in the order of time, may vary in space irregularly and in a different manner for each individual of the protected species.

Expressing, as before, the characters of the class in terms of the object imitated, the present group may be defined as follows:—

V. Cases in which the imitated object is constant or variable in time, but variable in space, for each individual of the species, this variability being met by a power of adaptation on the part of each individual of the disguised species.

Theory of variable protective colouring.

The cases of ordinary protective resemblance, as contained in the

* Proc. Boston Soc. of Nat. Hist. vol. xiv. April 5th, 1871.

first four classes, are in my belief well explained by natural selection. In applying this principle to the cases of Classes III. and IV. the law of "inheritance at corresponding periods of life," as developed by Darwin*, should be borne in mind. Such cases as have been included in Class V. have hitherto been regarded as due to the direct action of external conditions; but I am strongly of the opinion that we see also in these cases a result attributable, in great part at least, to the action of "the survival of the fittest."

Let us consider, for instance, in what manner natural selection acts in an ordinary case of protective resemblance, say in a larva which simulates its food-plant in colour. Those who maintain the descent theory believe that in such a case varieties which in any way resembled their food-plant in colour more frequently escaped detection, while their less fortunately coloured brethren were destroyed, generation after generation, by the rigorous persecution of their foes; this selecting action, continued through many generations, results at length in the disguise we now behold. It is to be observed that in this explanation no account is taken of the cause of the original variations in the colour of the larva. The variations may, and most probably do, arise in many such cases by the direct action of the colouring-matter of the leaves on the tissües of the larva†. Thus it is well known that no internal feeding-larva is green, while legions of arboreal feeders are so coloured. It might be argued, therefore, that such colouring is due to the presence of chlorophyl in the insect's food, and has, consequently, nothing to do with natural selection. It can be shown, however, that the green colouring is advantageous to the species that possess it, by rendering them inconspicuous to their enemies; whence it follows that any variety departing from this mode of colouring (that is, any variety in which the chlorophyl was not discernible through the skin) would be weeded out by natural selection, whose function would therefore be in this case to maintain the green colour of the insects, regardless of the cause of such colour.

An analogous example presents itself in the case of brightly coloured larvæ. The colours have been shown by Mr. Wallace to be due in such cases to the survival of the more brightly coloured individuals through many series of generations. Now, as the colours in these larvæ serve merely as a signal of distastefulness‡, it is plain that the elaborate and regular patterns we so often behold on these creatures are quite superfluous for the purpose of warning, and are therefore independent of natural selection. While attributing, then, the production of the *pattern* to the unknown laws of growth, we are justified in regarding the general production of *colour* as a pro-

* 'Variation of Animals and Plants under Domestication,' vol. ii. chap. xiv. pp. 75–80.

† [In a recently published memoir on cholophyl, by M. J. Chantard (Comptes Rendus hebdomadaires des séances de l'Académie des Sciences, Jan. 13th, 1873), the author announces the discovery of this substance in an unaltered state in the tissues of certain leaf-feeding insects.—March 6th, 1873.]

‡ See Wallace's 'Contributions to the theory of Natural Selection,' p. 117.

duct of natural selection, which works in this case, as in all other cases, upon the variations of colour presented to it by nature, quite regardless of the manner in which the colour is primarily produced —regardless whether it is hypodermal or epidermal, whether it is a colour due to interference, or a colour due to pigment-cells in the skin.

A similar mode of reasoning applied to such cases of variable protective colouring as have been considered in this paper will, I imagine, serve to establish the truth of the proposition, that such cases are "attributable, in great part at least, to the action of the 'survival of the fittest.'"

Let us take the several groups of cases included in Class V. in the order already dealt with, and apply this reasoning to them. We have first to deal with larvæ which feed on several plants of different colours, and which are capable of adapting themselves to the colour of the particular plant on which they are feeding. Now, granting that this power of changing colour is beneficial to the insects by affording them concealment, a truth which no entomologist who has witnessed any of these cases will deny, it follows that natural selection would eliminate any variations tending to depart from this useful power of adaptability to the colour of the food-plant. Here, then, the function of natural selection, as in the illustration first brought forward, is simply to maintain a power possessed by the larva, regardless whether this power resulted in the first instance from the direct action of external conditions—regardless whether it is under the control of the creature's will or not. Assuming, in these cases, that the change of colour is due to the presence of the colouring-matter of the food-plant in the tissues of the caterpillar (as it most probably is), we might say in more concrete language that natural selection is and has been at work weeding out those individuals whose skins were not sufficiently transparent to allow the colouring-matter to appear through them.

Passing on to those pupæ which appear to be photographically sensitive, we shall find a similar mode of reasoning to obtain. Larvæ in selecting a suitable place to assume the pupal condition are liable to be exposed on surfaces of different colours. It will be admitted that pupæ which harmonize with the colour of their resting-surface would be more likely to escape detection than individuals not thus coloured. I need only allude, *en passant*, to the perfect manner in which the pupa of *Synchloë brassicæ* matches the speckled wall on which we so often find it. Now a pupa is liable to be exposed on a surface of any colour; how can such a state of affairs be met? obviously only by giving to each individual a power of changing colour in correspondence with the colour of its resting-surface. Observe, now, that we are not here in any way concerned with the primary cause of such a faculty: natural selection only takes advantage of the property, no matter how it has originated.

We may finally proceed to the examples of this class furnished by insects in the perfect state. An insect adapted to the colour of one district, but forced to roam into other districts in search of food or for other purposes, would be certainly benefited by being able to assume the colour of any locality in which it might find itself. Here natural selection works, as before, in producing and maintaining a power to change colour, it being quite immaterial to this agency at what period of the insect's life the change of colour is induced, whether it only occurs in individuals born in the district, or in individuals that have roamed into the district in the perfect state and undergone subsequent change. So also is natural selection regardless, in these cases, whether the disguising colour is congenital or consequent on the emergence from the pupæ, whether it is a colour exposed by ecdysis or one due to actual change of tint in the tissues—regardless also whether the change is voluntary or involuntary on the part of the insect.

The examples adduced from classes of animals other than insects are capable of being reasoned upon in a precisely similar manner; but it is needless here to extend the argument.

The results of this inquiry have thus led me to conclude that the cases which I have grouped under Class V. are cases which differ from ordinary protective resemblance, inasmuch as the primary variations are indubitably produced by direct action, but controlled and accelerated by natural selection. As the particular manner in which these original variations are produced is, in nearly all these instances, quite unknown, the observation made at the outset, that the study of these cases "offers a wide and interesting field for observation," is, I think, fully justified. The part played by natural selection in the production of the class of cases I have here discussed is thus in some degree analogous to the function ascribed to this agency by Mr. Herbert Spencer in the formation of the woody vessels in trees*—that, viz., of an accelerator and controller of results primarily due to what this philosopher has, in mechanical terms, called "direct equilibration" †.

In conclusion I beg leave to present in a tabular form the results of the classification above set forth, so as to include Class V., and thus embody all the known cases of protective resemblance. The classification refers, as before, to the object imitated; but it is to be understood that the "object imitated" and the "disguising characters" of the species are convertible terms. A change in character witnessed in the object simulated in passing from one district to another, or in the same district, is termed for brevity a variation "in space," while a change occurring in the course of time is termed

* "On Circulation and Formation of Wood," Trans. Linn. Soc. vol. xxv.

† The inquiry has suggested itself whether there might not occur conditions under which a case of ordinary protective resemblance might be mistaken for a case of Class V. It seems probable at first sight that natural selection would be able to produce local modifications in the disguising characters of protected species corresponding to local changes in the characters of the imitated object. Such local modifications might occur in districts so situated as to prevent interchange of species; but in contiguous districts presenting facilities for intercommunication it seems to me that crossing would entirely prevent the formation of local varieties by natural selection, unless this agency were aided by "direct action," under which circumstances we should have an example of Class V.

for the same reason a variation "in time." The time represented is the lifetime of the individual.

Class.	For the aggregate of individuals forming a species, the characters of the object imitated during the lifetime of the individual are:—	
	In space.	*In time.*
I.	Constant.	Constant.
II.	Variable.	Constant.
III.	Constant or variable.	Vary once.
IV.	Constant or variable.	Vary periodically.
	For each individual of the species, the characters of the object imitated during the lifetime of the individual are:—	
	In space.	*In time.*
V.	Variable.	Constant or variable.

2. Measurements of the Red Blood-corpuscles of Batrachians. By George Gulliver, F.R.S.

[Received December 6, 1872.]

A comparative view of the sizes of these corpuscles in several British and foreign Batrachians was given in my lecture, July 15, 1871, to the East Kent Natural-History Society, at Canterbury, as noticed in the 'Quarterly Journal of Microscopical Science,' January 1872, but without specification of the measurements. These are now severally enumerated, with the addition of others relating to such species as I have since examined. I know not that measurements pertaining to so many Batrachian species have heretofore been presented at one view, and all made by exactly the same means and under the same conditions. Hence it is hoped that the following Table may prove interesting, and induce zoologists to take every opportunity of preserving and examining specimens of blood-corpuscles so singularly large as those of the Batrachians. Of the Cæciliæ we at present know nothing of these corpuscles. Will no travelling naturalist supply us with an account or specimens of them? My own measurements in the Batrachians have been confined entirely to the species which are mentioned in the following Table, and which I have met with alive in menageries and elsewhere.

Having at Canterbury insufficient books on the historical part of the subject, this will not be attempted at present. Only I remember that Rudolph Wagner long since discovered the large size of the red blood-corpuscles of *Proteus*, and Van der Hoeven soon afterwards their almost equal magnitude in *Cryptobranchus japonicus*, that Riddel quite recently proved their preeminent largeness in *Amphiuma*, and that they were originally examined and measured and their Batrachian character shown by me in *Lepidosiren*. Of some of the animals mentioned in the present Table, the blood-corpuscles, so far as I know, have not been previously examined.

Lepidosiren is here placed among the Batrachians, not to imply any view as to its true position, but merely because this paradoxical creature has blood-disks like in size to those of a Batrachian, and unlike, in this respect, to those yet known of any regular fish. *Cryptobranchus japonicus* is the same as *Sieboldia maxima* of the following Table, and of some of the former 'Proceedings' of the Society.

Table of Measurements of the Red Blood-Corpuscles of Batrachians.

According to my invariable practice, all the measurements are expressed in vulgar fractions of an English inch; and of the corpuscles the long diameter is denoted by L. D., the short diameter by S. D., and the thickness by T. The average sizes only are given; but it should be understood that many are a third larger and a third smaller than the mean, and a few occasionally still more deviating from it, while there is every gradation of size between the extremes; still the majority of the corpuscles are of the average size. And all this is true of the red blood-corpuscles of most vertebrates. The animals are here set down in the order of the largeness of these corpuscles, except when this would confuse species of different genera of the Frogs and Toads.

	L. D.	S. D.
Amphiuma tridactylum	$\frac{1}{363}$	$\frac{1}{615}$
Nucleus	$\frac{1}{1143}$	$\frac{1}{2000}$
Proteus anguinus..................	$\frac{1}{400}$	$\frac{1}{727}$
Nucleus	$\frac{1}{1600}$	$\frac{1}{2666}$
Siren lacertina....................	$\frac{1}{420}$	$\frac{1}{760}$
Nucleus	$\frac{1}{1142}$	$\frac{1}{2007}$
Sieboldia maxima..................	$\frac{1}{450}$	$\frac{1}{800}$
Menopoma alleghaniense............	$\frac{1}{563}$	$\frac{1}{1000}$
Nucleus	$\frac{1}{1333}$	$\frac{1}{2286}$
Lepidosiren annectens..............	$\frac{1}{570}$	$\frac{1}{941}$
Nucleus	$\frac{1}{1455}$	$\frac{1}{2900}$
Siredon humboldtii	$\frac{1}{571}$	$\frac{1}{1000}$
Nucleus	$\frac{1}{2000}$	$\frac{1}{3000}$

	L. D.	S. D.
Lissotriton punctatus	$\frac{1}{800}$	$\frac{1}{1280}$
Nucleus	$\frac{1}{1778}$	$\frac{1}{2667}$
Triton bibronii	$\frac{1}{848}$	$\frac{1}{1280}$
Nucleus	$\frac{1}{1901}$	$\frac{1}{3000}$
—— *cristatus*	idem	idem
Rana esculenta	$\frac{1}{1000}$	$\frac{1}{1445}$
—— *temporaria*	$\frac{1}{1108}$	$\frac{1}{1821}$
T. $\frac{1}{7112}$.		
Nucleus	$\frac{1}{3114}$	$\frac{1}{6297}$
Tadpole $\frac{1}{2}$ inch long	$\frac{1}{1098}$	$\frac{1}{1650}$
Bufo vulgaris	$\frac{1}{1043}$	$\frac{1}{2000}$
T. $\frac{1}{5627}$.		
Nucleus	$\frac{1}{2802}$	$\frac{1}{5261}$
—— *calamita*	$\frac{1}{1333}$	$\frac{1}{1895}$
—— *viridis*	idem	idem
Bombinator igneus	idem	idem
Pelodryas cæruleus	$\frac{1}{1231}$	$\frac{1}{2000}$

The number of animals in the above Table being insufficient to warrant peremptory generalizations, which might not prove good against further observation, we can at present merely note what is indicated by these measurements; and the results conform generally to those already published (scattered and piecemeal), but not, it would seem, commonly realized by physiological writers.

1. The largest red blood-corpuscles belong to the Proteidæ, and the largest of all to *Amphiuma* of this family.

2. The smallest corpuscles occur in the Frogs and Toads, and the smallest of all in some species of *Bufo*, though the common Toad has slightly larger corpuscles than the common Frog.

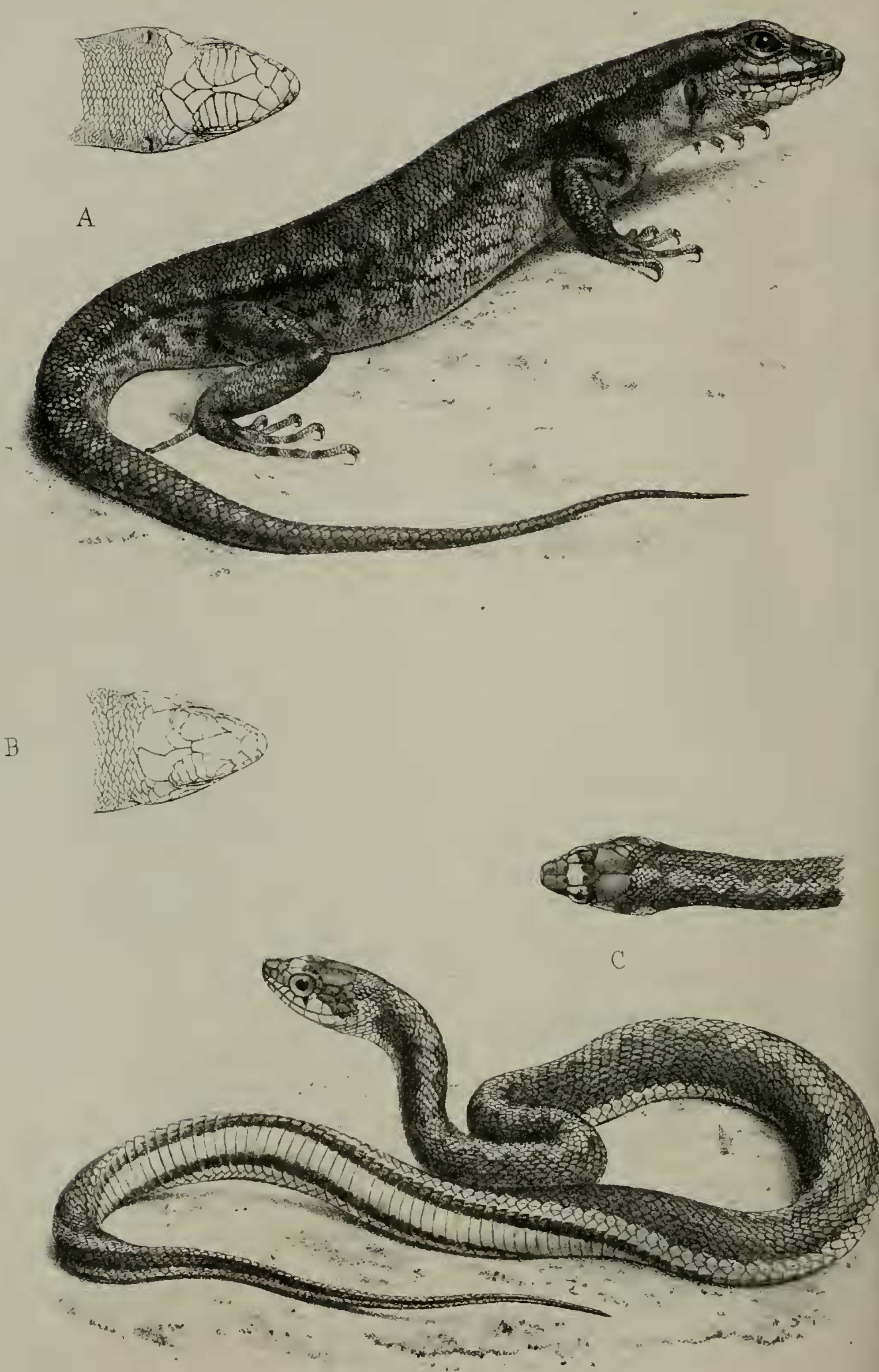
3. The corpuscles are much larger, without exception, in the Urodela than in the Anura.

4. The difference between the corpuscles of *Siredon* and *Lepidosiren* is scarcely appreciable or nought, save that the nucleus is smallest in the former.

5. *Amphiuma* and *Sieboldia*, both caducibranchiate species, have much larger corpuscles than the perennibranchiate *Siredon*.

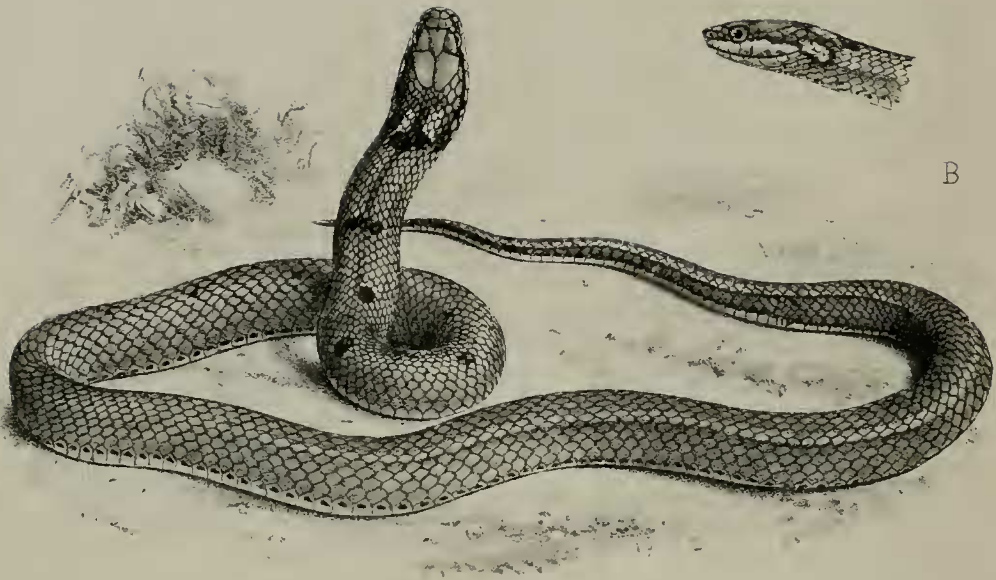
6. The corpuscles are not so large in *Sieboldia*, which is the largest species, as in *Amphiuma* and *Proteus*, which are much smaller species; and so, too, of *Triton* and *Lissotriton*.

Finally, Rudolph Wagner held that the greatest magnitude of the corpuscles is related to the persistency of the gills. More observations than we yet possess would be required to determine what degree of truth there may be in this tenet. Though it is commonly adopted,

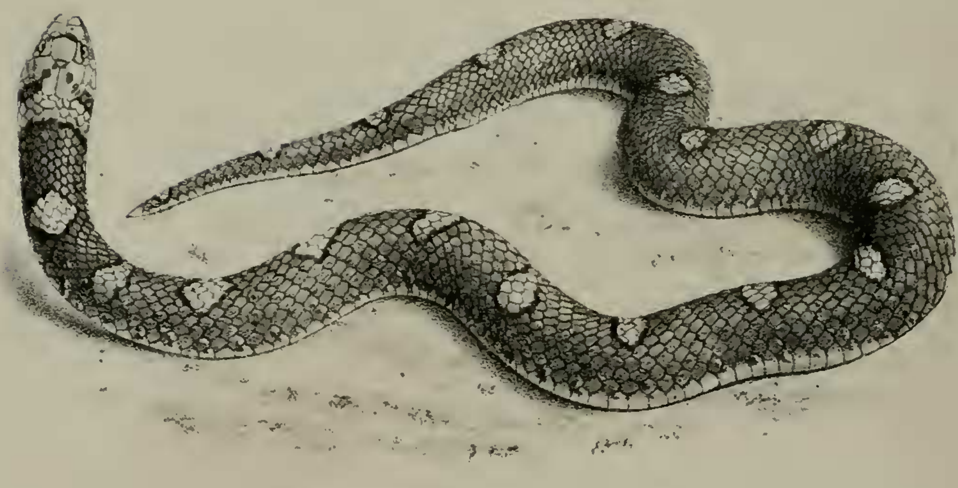


G. H. Ford. Mintern Bros. imp.

A. HINULIA NIGROLABRIS. B. HINULIA VARIEGATA.
C. TROPIDONOTUS CALLISTUS.



B



A

G. H. Ford. Mintern Bros. imp.

A. OLIGODON NOTOSPILUS. B. HOLOCERRHUM PHILIPPINUM.

unconditionally, in some of our latest and largest books of micrographic and comparative anatomy, and without any reference to the eminent physiologist who originally propounded it, the present measurements are at variance with Wagner's conclusion. Indeed it was as much nullified by Van der Hoeven's discovery, in the year 1841, of the large size of the corpuscles in *Cryptobranchus*, and by the proof much later of their still greater magnitude in *Amphiuma*, both species with evanescent gills. As little relation appears between the size of the species and the size of the corpuscles; for these are larger in the little *Proteus* and *Amphiuma* than in the gigantic *Sieboldia*. And this accords with my old measurements, which, while proving that there is such a relation in one and the same order of mammalia and birds, showed that the same rule is not applicable to the lower Pyrenæmatous Vertebrates.

3. Notes on some Reptiles and Batrachians obtained by Dr. Adolf Bernhard Meyer in Celebes and the Philippine Islands. By Dr. A. Günther, F.R.S., F.Z.S.

[Received December 11, 1872.]

(Plates XVII., XVIII.)

Hydrosaurus.

In Proc. Zool. Soc. 1872, p. 145, pls. 7 & 8, I have described and figured two species of *Hydrosaurus* from the Philippines; but the exact habitat was known of one of them only. I am now able to give more precise information in this respect.

1. *Hydrosaurus marmoratus* is described by Cuvier and Wiegmann as coming from Manila. A fine specimen was obtained by Dr. Meyer in Luzon, so that this species appears to be confined to this island.

2. *Hydrosaurus nuchalis* is from Negros; several specimens of different ages were brought by Dr. Meyer; another we have bought of Hrn. Salmin, all showing the peculiar development of the nuchal scales.

3. *Hydrosaurus cumingii* from Mindanao is still represented by one example only.

Tropidophorus grayi.

One specimen was obtained by Dr. Meyer in Luzon; and at a somewhat later period we purchased three other examples of different ages of Hrn. Salmin, without precise information as regards their habitat. All these specimens differ slightly from the typical examples in having smaller gular scales.

Hinulia variegata. (Plate XVII. fig. B.)

This species has been very properly distinguished by Prof. Peters from *Hinulia nævia*, which has smaller scales, and the vertical separated from the rostral by the frontals. *H. nævia* is not confined to New Guinea; we have one specimen from Dillwyn's Bornean collection; it is not well preserved.

HINULIA NIGROLABRIS. (Plate XVII. fig. A.)

Closely allied to *H. nævia* and *H. variegata*, but distinguished from the former by considerably longer toes, and from the latter by having the vertical shield separated from the rostral by the frontals.

The middle of the body is surrounded by forty-six longitudinal series of scales. Upper labials five or six. Ear-opening large, without denticulation. The fore leg, when stretched forward, extends to, or even slightly beyond, the end of the snout, the hind leg beyond the axil. Upper parts chestnut-brown, with irregular transverse black spots; sides and legs variegated with black and brown. Tail nearly entirely black. A black band from the eye, above the tympanum, extends to the side of the neck, where it is lost in the brown coloration of the sides. The meeting edges of the jaws black.

	inches.	lines.
Distance of the snout from the eye	0	3
,, ,, ,, tympanum	0	9
,, ,, ,, axil	1	3
,, ,, ,, vent	3	8
Length of the fore leg	1	$3\frac{1}{3}$
,, third and fourth fore toes	0	4
,, hind leg	2	0
,, third hind toe	0	6
,, fourth hind toe	0	$8\frac{2}{3}$
Total length	9	6

One specimen, obtained by Dr. Meyer in Northern Celebes.

COPHOSCINCUS INFRALINEOLATUS.

Scales smooth; supranasal shields none; lower eyelid with a transparent disk; ear-opening hidden.

Snout depressed, not produced. Vertical bell-shaped, in contact with the præfrontal. Scales in twenty-two longitudinal series, of which the two middle on the back are very broad, twice as broad as the adjoining series. There are forty-two scales in a longitudinal series between the axil of the fore leg and the vent. Two large præanal scales. Black above, with three golden-yellow longitudinal bands, as broad as the black ground-colour between. The middle band commences on the end of the snout, and is continued on the tail; the lateral band commences on the superciliary edge, and runs along the side of the back to the root of the tail, where it is lost. The entire lower side with fine brown longitudinal lines running along the meeting edges of the rows of scales. Limbs finely reticulated, and the toes annulated, with black.

A single specimen was obtained by Dr. Meyer on Sangi Island; it has lost the greater portion of its tail.

	lines.
Distance between snout and vent	17
„ „ „ and fore leg..............	7
Length of fore leg	5
„ hind leg.............................	7

COPHOSCINCUS SUBVITTATUS.

Scales smooth; supranasal shields none; lower eyelid with a transparent disk; ear-opening hidden, but distinctly indicated by a sunken place.

Snout pointed, not produced or depressed. Vertical bell-shaped, in contact with the præfrontal. Scales in twenty-two longitudinal series, of which the two middle on the back are very broad, nearly twice as broad as the adjoining series; and the latter, again, are twice as broad as the next outer ones. There are forty scales in a longitudinal series between the axil of the fore leg and the vent. Two large præanal scales. A broad bluish-white band runs along the middle of the back from the snout, and appears to be continued on the tail; it is bordered on each side by a narrower black band, which becomes indistinct in the posterior half of the trunk. Along the side of the head and neck there is another similar white and black band, the white band proceeding from the supraciliary edge, but this band is lost behind the shoulder. Sides of the body and lower parts whitish, immaculate. Legs with very faint brownish dots.

A single specimen was obtained by Dr. Meyer at Manado: it had lost its tail; and only a short portion is reproduced.

	lines.
Distance between snout and vent	18
„ „ „ „ fore leg............	6½
Length of fore leg	4½
Length of hind leg..........................	6½

DRACO ORNATUS, Gray.

In the 'Reptiles of British India,' I have identified Gray's *Draco ornatus* with *D. spilopterus* of Wiegmann. This is so far correct, that the adult male specimen (Cat. Lizards, p. 235, spec. *c*) is really of Wiegmann's species; but the others (specimens *a*, *b*, *d*) belong to a really distinct species, for which the name proposed by Gray must be retained. This species is most closely allied to, and may be regarded as the Philippine representative of, *Draco volans*; but the tympanum is covered with scales. *D. ornatus* is distinguished from *D. spilopterus* by the different coloration of the lower surface of the wings, which have some more or less confluent large black blotches, whilst in *D. spilopterus* the spots are small and scattered.

DRACO SPILONOTUS, Gthr.

By inadvertence this species was described in the text of Proc. Zool. Soc. 1872, p. 592, under the name of *Draco spilopterus*, whilst the correct name (*Draco spilonotus*) was used on pl. 35.

Bronchocela marmorata, Gray.

From an examination of specimens collected by Dr. Meyer in Luzon I have no doubt that *Calotes* (*Bronchocele*) *philippinus* of Peters (Monatsber. Ak. Berl. 1867, p. 16) is identical with this species. Indeed one might even hesitate to separate this Philippine form from that of Celebes, *B. celebensis*. The principal distinctive character appears to be the pholidosis of the loreal region, which is almost granular in *B. marmorata*, and formed by distinct scutella in *B. celebensis*. In the former I have counted from 25 to 30 longitudinal series of scales on the side of the body, in the latter from 22 to 26.

Lophura amboinensis.

There are fifteen examples of all sizes in the British Museum; the localities where they have been obtained are Java, Amboyna, Celebes, and the Philippine Islands. I have arrived at the conclusion that no constant distinctive characters can be pointed out in specimens from different localities, and that there are not two individuals perfectly alike with regard to the development and distribution of the large scales and tubercles. As already observed by Wiegmann, the rostral crest is somewhat more developed in Philippine specimens (*L. pustulata*) than in those from Java and Amboyna, and is visible even in very young specimens; but so slight a difference cannot be regarded as a specific distinction. Thus I must hesitate to adopt the *Lophura shawii* of Gray and the *Lophura celebensis* recently distinguished by Peters (Monatsber. Ak. Berl. 1872, p. 581); the latter is represented in the British Museum by an adult female received many years ago from the Leyden Museum with the name of *Basiliscus celebensis*.

Peripia mutilata, Wiegm.

I have no doubt that Professor Peters is correct in supposing that *Peripia peronii* (D. & B.) is identical with *Peropus mutilatus* (Wiegm.).

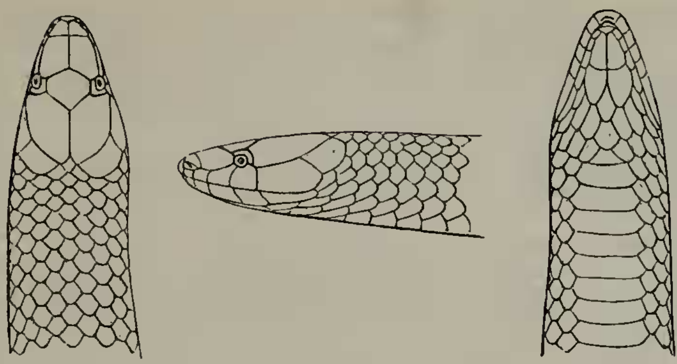
Calamaria modesta (D. & B.).

Dr. Meyer has obtained a singular variety of this species at Manado. The upper parts are of a light coffee-brown, dotted with darker. The abdomen is blackish, with a well-defined median white longitudinal band. This peculiar distribution of the colours of the abdomen I find more or less distinctly indicated in specimens from Java.

Oxycalamus oxycephalus. (Fig. p. 169.)

Rhabdosoma oxycephalum, Günth. Colubr. Sn. p. 242.

This species is most closely allied to *O. longiceps* (Cantor) from Pinang; but a direct comparison is rendered almost impossible by the bad state of preservation of the type of the latter species. *O. oxycephalus* lacks a præorbital; the number of ventral scutes is 137–152.



Oxycalamus oxycephalus.

STENOGNATHUS MODESTUS, D. & B.

Rhabdosoma leporinum, Günth. Col. Snak. p. 12, is identical with this species, as already indicated by Peters, Berl. Monatsber. 1861, p. 684. Seven or eight upper labials. Duméril's statement that this snake is found in Java, is probably erroneous, as several other undoubtedly Philippine snakes have been stated by him to be from Java, where they do not occur.

OLIGODON NOTOSPILUS. (Plate XVIII. fig. A.)

Scales in fifteen rows. Loreal small but distinct; one præ- and one postocular; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Ventral shields 143; anal entire; subcaudals 35 (the seven anterior not divided). Blackish ash, many scales with a very small white dot; along the median line of the back a series of eighteen large rhombic yellow black-edged spots, three of which belong to the tail. Head yellow, with two angular black cross bands. Lower parts uniform yellowish.

A single example of this beautiful snake was obtained by Dr. Meyer on Mindanao; it is $10\frac{1}{2}$ inches long, of which the tail takes $1\frac{1}{2}$ inch.

COMPSOSOMA MELANURUM (Schleg.).

Dr. Meyer has obtained several examples of a light-coloured variety with reddish tail in Luzon and Negros. This variety is mentioned by Duméril & Bibron (p. 301), and is again described by them as *Plagiodon erythrurus* (p. 175) from Java. Several other Philippine reptiles having been erroneously stated by Duméril & Bibron to have been obtained from Java, I doubt whether the typical example of their *Pl. erythrurus* was received from that island. In Jan's 'Iconographie' this snake is also figured twice, under the names given by Duméril and Bibron.

ZAOCYS LUZONENSIS.

Scales smooth, in fourteen rows, a single elongate loreal; occipitals truncated behind; seven upper labials, of which the third and fourth enter the orbit; the fifth triangular, with its upper point not reaching the postocular or the temporal; two præoculars, the lower small, the upper reaching the upper surface of the head but not the vertical; two postoculars. Temporals 2+2, or 2+2+2. Ventrals 205; anal bifid, subcaudals 119. Upper parts brownish-olive, nearly all the scales with black margins; lower parts whitish. the posterior part of the belly and the subcaudals black.

One specimen was obtained by Dr. Meyer in Luzon; it is 8½ feet long, the tail measuring 26 inches.

TROPIDONOTUS MANADENSIS.

Allied to *T. stolatus*, but with the anterior frontals obtuse in front. Scales in nineteen rows, strongly keeled, except those of the outermost series. Head somewhat depressed, and rather dilated behind; eyes of moderate size, Loreal large, a little longer than deep. One præ-, three postoculars. Eight upper labials, the third, fourth, and fifth entering the orbit. Temporals 2+3. Ventrals 138; anal bifid; subcaudals 76. Dentition diacranterian. Upper parts brownish olive; a very indistinct broad darker band runs along the back. The upperside of the head and neck are uniform greenish olive, and behind bordered by a horseshoe-like black band, with the convexity directed backwards, and its branches running downwards on the sides of the neck; the parts immediately behind this band are yellowish. A rather irregular series of black spots along each side of the anterior portion of the abdomen, the remainder of which is white. The sutures between the upper labials black.

One specimen, 18 inches long (tail 5 inches) has been obtained by Dr. Meyer at Manado.

TROPIDONOTUS CALLISTUS. (Plate XVII. fig. C.)

Scales in 21 series, all strongly keeled, not emarginate behind. Head rather deep and short; eye large. Anterior frontals longer than posterior; occipitals as long as vertical and posterior frontals together, rounded behind; loreal deeper than long; the single anterior ocular reaching to the upper surface of the head, but not to the vertical; four postoculars. Nine upper labials, the fourth, fifth, and sixth entering the orbit; temporals 2+2. The posterior chin-shields longer than the anterior, and much divergent. Ventrals 156; anal divided; subcaudals 76. Maxillary teeth in a continuous series, the posterior scarcely longer than the preceding.

A greenish-olive band commences from a bright yellow spot on the neck, runs, four scales broad, along the median line of the back and the tail; it is bordered on each side by a dark brown band, seven scales broad in the middle of its length, encroaching with its zigzag outline upon the median dorsal band. The outermost series of scales and the corners of the abdominal shields are yellow, this colour forming another straight narrow band. A black band along each side of the belly. All these bands extend to the end of the tail. Upperside of the head black, with a yellow interocular cross band. Side of the snout and upper lip yellow.

A single specimen, 12 inches long (tail 2¾ inches), was obtained by Dr. Meyer in Northern Celebes.

HOLOGERRHUM PHILIPPINUM, Gthr. (Plate XVIII. fig. B.)

This snake must be extremely scarce or very locally distributed, as none of the collections from the Philippines which have reached Europe during the last fifteen years contained another specimen. However, there appears to be one example in the Paris Museum, which has been figured by Jan under the name of *Cyclochorus maculatus* (Iconogr. livr. xxxvi. 1870, pl. 6. fig. 3). He states (Index des Planches) that this specimen is from Java, which is very doubtful. The groove of the posterior maxillary teeth is, in our specimen, not lateral, as figured by Jan, but anterior. I should now describe the nasal plate as divided rather than as single. Ventrals 144, subcaudals 40.

POLYPEDATES SIMILIS.

Closely allied to *P. signatus*, but entirely smooth.

Canthus rostralis distinct; loreal region concave, vertical; eye large; tympanum not quite the size of the eye. *Back and sides smooth, without granulation.* Fingers slender, quite free, with very small disks; toes slender, two thirds webbed, also with the disks very small. Two small metatarsal tubercles. Inner nostrils narrow, but wider than the Eustachian tubes; vomerine teeth in two very short oblique converging series between the inner nostrils. Upper parts black, a well-defined greenish-white band runs along the upper margin of the snout and eyelid, and along each side of the back. No brown spots on the back or sides; a whitish line along the coccyx; *a well-defined whitish band along the margin of the upper lip,* terminating below the tympanum. Legs transversely barred with brown and reddish white. Lower parts whitish.

One specimen from Laguna del Bay.

	millims.
Total length	39
Fore limb	27
Third finger	$8\frac{1}{2}$
Hind limb	65
Tarsus	11
Fourth toe	18

PLATYMANTIS MEYERI.

Similar in habit to *Pl. plicifera*, but with more slender limbs. Snout scarcely longer than the eye. Vomerine teeth on two very short and very prominent oblique ridges, situated inwards and backwards of the inner nostrils, very far apart. Inner nostrils and Eustachian openings narrow. Tympanum not half the size of the eye. Back with rather short longitudinal folds. Disks of fingers and toes extremely small. *First finger a little longer than the second.* Toes with a rudiment of a web. Two small metatarsal tubercles. Brownish above, marbled with darker; a broad light reddish band from the snout along the median line of the back. Lower parts whitish, throat marbled with brown.

Oue specimen of this species, as well as of *P. plicifera*, was obtained by Dr. Meyer at Laguna del Bay.

	millims.
Total length	32
Fore limb	20
Hind limb	60
Distance between vent and heel	33
Fourth toe	17

4. A Monographic Revision of the Genera *Zephronia* and *Sphærotherium*, with Descriptions of new Species. By Arthur G. Butler, F.L.S., F.Z.S., &c.

[Received December 11, 1872.]

(Plate XIX.)

In the 'Annals and Magazine of Natural History' for last November, I added eighteen species to these two genera. Subsequently I have been favoured by Mr. Wilson Saunders with a sight of his collection, in which I have discovered two new *Sphærotheria*; whilst a recent examination of the Banksian Collection in the British Museum has brought to light two examples of a fine new *Zephronia*.

As I have had some little difficulty in determining the species of these two genera, owing to their great similarity one to another, I have thought that it would facilitate the study of the group if I were to draw up a synonymic list of the described species, grouping them into sections founded upon well-marked structural characters.

In the case of some of Brandt's species (the original descriptions of which I have hitherto sought for in vain under the guidance of the references given in Gervais's 'Aptères'), I have given translations of the diagnoses as cited by M. Gervais. This I have, however, only done either when the species described is unknown to me, or when certain characters mentioned by the author indicate to which of my sections the species belongs. I have been obliged to rename one of the forms figured by Koch in his 'Die Myriapoden,' inasmuch as it does not agree with Brandt's description as cited by Gervais.

The number of species now described in the two genera will amount to fifty-one.

Order APTERA.

Suborder Myriopoda.

Division Chilognatha.

Family Glomeridæ, Gervais.

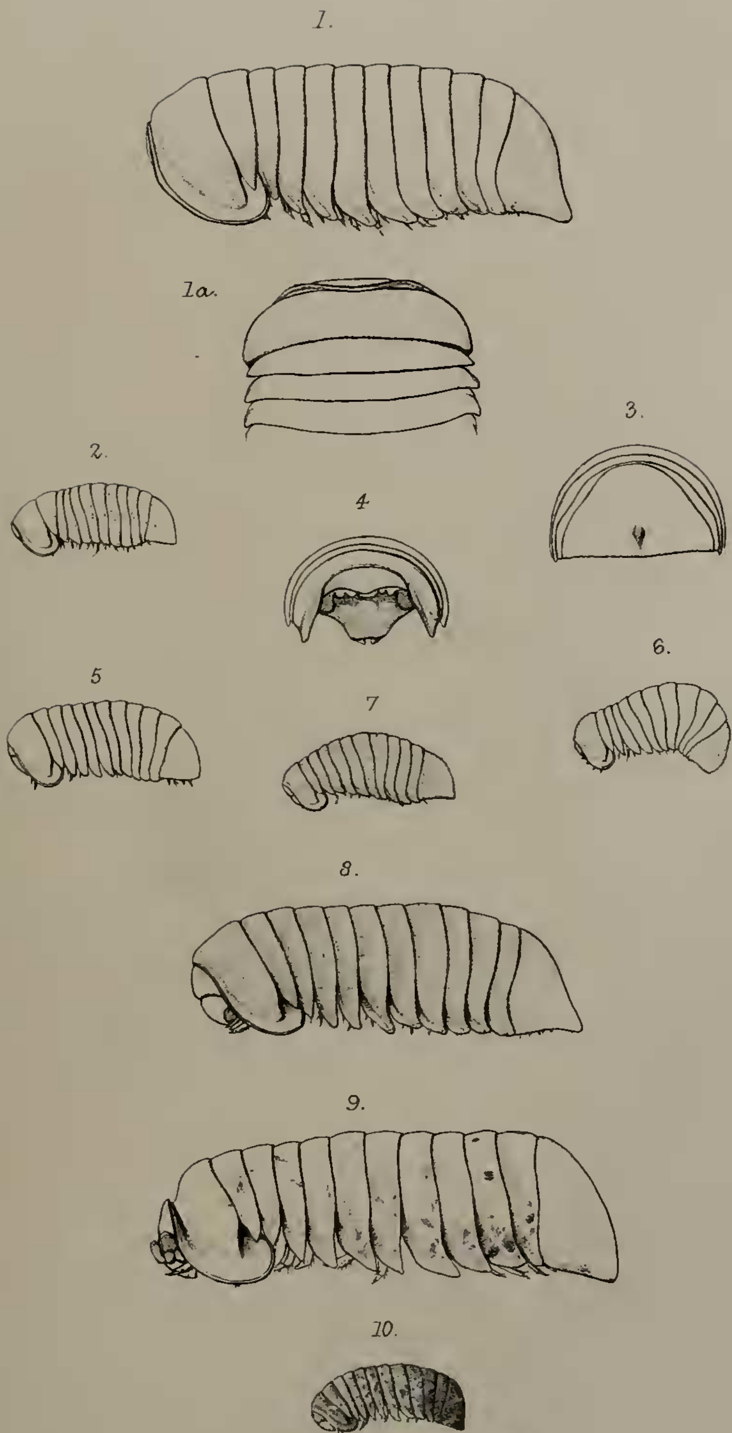
Genus Sphærotherium, Brandt.

Div. 1. *Last dorsal segment having a more or less distinct external rim.*

Sect. *a. Anterior portion of the last segment abruptly thickened.*

1. Sphærotherium rotundatum.

Sphærotherium rotundatum, Brandt, Bull. Nat. Mosc. pl. 6, p. 198. n. 1 (1833); Koch, Myriapoden, i. pl. 19. f. 38 (1863).



G.H.Ford.

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NEW SPECIES OF GLOMERIDÆ.

Zephronia rotundata, Gervais, Ann. Sc. Nat. 2nd ser. vii. p. 42 (1837).

South Africa (*Sir Andrew Smith*). B.M.

2. Sphærotherium glabrum, n. sp. (Plate XIX. figs. 1, 1 *a*.)

Pale castaneous, with head, nuchal plate, and posterior margins of dorsal segments dark castaneous, almost pitchy.

Head smooth, shining, with two broad longitudinal sulcations, above and between which is a small reniform depression; coarse punctures sparsely distributed all over, excepting in the centre; nuchal plate smooth, flattened, with indistinct series of punctures in front; dorsal segments smooth, shining, their lateral wings coarsely punctured, especially in front; last segment coarsely and somewhat densely punctured all over, with central area somewhat tumid and outer edge projecting, especially in the centre, so as to form a sloping and consequently indistinct rim.

Length 1 inch 10 lines, width 1 inch 1 line.

Madagascar. Two specimens. Coll. Saunders.

Allied to *S. rotundatum* and *obtusum*.

3. Sphærotherium punctulatum.

Sphærotherium punctulatum, Brandt, Bull. Acad. St. Pétersb. 1841; Rec. Mém. Myriap. p. 179.

"Head subrugose, entirely marked with very close punctuations. Collar subrugose, with punctuations arranged in a row in front and scattered above. First dorsal segment and the following marked with very dense punctuations, visible to the naked eye. Last segment marked with more numerous punctuations than the others, swollen behind and thickened. No shining lines upon the centre of the last dorsal segments. Colour olivaceous; hind margins of the segments ferruginous."

Cape of Good Hope (*Brandt*).

Appears to be referable to this section, and seems almost identical with *S. obtusum*.

4. Sphærotherium obtusum.

Sphærotherium obtusum, Koch, Myriapoden, i. p. 5, pl. 2. f. 5 (1863).

Port Natal (*Gueinzius*). B.M.

Sect. *b*. *Anterior portion of the last segment not thickened.*

5. Sphærotherium nigrum.

Sphærotherium nigrum, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 359. n. 4, pl. 18. fig. 11 (1872).

South Africa (*Sir Andrew Smith*). Type, B.M.

6. Sphærotherium grossum.

Sphærotherium grossum, Koch, Myriapoden, i. p. 5, pl. 2. f. 6 (1863).

Cape of Good Hope (*Koch*).

The external rim on the last segment of this species seems feebly developed, judging by Koch's figure.

Div. 2. *Last dorsal segment with a more or less pronounced sinus behind.*

Sect. *a. Dorsal segments roughened, dull; head and nuchal plate clothed with hair.*

7. SPHÆROTHERIUM SINUATUM.

Sphærotherium sinuatum, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 359, pl. 18. f. 10 (1872).
Sarawak (*Wallace*). Type, B.M.

Sect. *b. Dorsal segments roughened, dull, clothed with short hair, and with longitudinal central shining ridge.*

8. SPHÆROTHERIUM DORSALE.

Zephronia dorsalis, Gervais, Hist. Nat. des Insectes, Aptères, iv. p. 79 (1847).
Zephronia pulverea, White, Ann. & Mag. Nat. Hist. ser. 3, vol. iii. p. 405, pl. 7. f. 4, 4*a*, 4*b* (1859), type.
Sphærotherium retusum, Koch, Myriapoden, pl. 19. f. 36 (1863).
Port Natal (*Gueinzius*). B.M.

Div. 3. *Last segment rounded, without external rim or depression.*

Sect. *a. A more or less continuous shining longitudinal dorsal ridge.*

9. SPHÆROTHERIUM LICHTENSTEINII.

Sphærotherium lichtensteinii, Brandt, Bull. Nat. Mosc. vi. p. 199. n. 3 (1833); Koch, Myriapoden, i. pl. 14. f. 29 (1863).
Zephronia lichtensteinii, Gervais, Ann. Sc. Nat. 2nd ser. vii. p. 43 (1837).
South Africa (*Sir Andrew Smith*). B.M.

Group *aa. Last segment with posterior central area projecting.*

10. SPHÆROTHERIUM PUNCTATUM.

Sphærotherium punctatum, Brandt, Bull. Nat. Mosc. vi. p. 199. n. 4 (1833).
Zephronia punctata, Gervais, Ann. Sc. Nat. 2nd ser. vii. p. 43 (1837).

"Head almost smooth, shining, marked by very large scattered punctuations above and in the middle. A row of very strong punctuations upon the front of the collar, with others larger and scattered upon the centre. Second and the following segments marked up to their inferior and posterior margin with strong punctures, easily visible to the naked eye. Punctuations of the last arch more close, but not visible to the naked eye; the latter a little thickened and swollen to the centre of its posterior margin. Sixth and following dorsal segments marked in their centre above by a projecting, longitudinal, smooth and shining line. Lateral process of the last segments provided with a little projecting ridge on the inner surface of their lateral làminæ. Colour olivaceous; hind margins ferruginous."

South Africa (*Sir Andrew Smith*). B.M.

Our specimen agrees in almost every particular with the above description; the longitudinal line, however, appears not to extend above the ninth dorsal segment, but it may be concealed under the overlapping margins of the segments. In an example in Mr. Saunders's collection, the longitudinal line extends from the second to the eleventh segment, but in some of them it is feebly indicated.

Sect. *b. Dorsal segments without longitudinal ridge; last segment compressed.*

11. SPHÆROTHERIUM COMPRESSUM.

Sphærotherium compressum, Brandt, Bull. Nat. Mosc. vi. p. 198. n. 2 (1833); Koch, Myriapoden, i. pl. 19. f. 39 (1863).

Zephronia compressa, Gervais, Ann. Sc. Nat. 2nd ser. vii. p. 43 (1837).

South Africa (*Sir Andrew Smith*). B.M.

12. SPHÆROTHERIUM RUGULOSUM.

Sphærotherium rugulosum, Brandt, Bull. Acad. St. Pétersb. 1841; Rec. Mém. Myriap. p. 179 (1841).

Outward aspect of *S. punctatum*, "of which it has also the form and colour. Anterior segments and middle of the body having upon the sides of the back some little ridges or projecting lines, very small, transverse, subparallel, and irregular. No little ridge above the insertion of the lateral laminæ of the posterior segments of the body. Sixth dorsal segment and the following more or less punctured over their whole superior surface. Last segment rugose, strongly marked with punctuations visible to the naked eye, attenuated at its posterior margin."

Cape of Good Hope (*Brandt*).

Sect. *c. Last dorsal segment rounded, not compressed.*

13. SPHÆROTHERIUM JAVANICUM.

Zephronia javanica, Guérin, Ann. Sc. Nat. 2nd ser. vii. p. 43 (1837); Iconogr. Règn. Anim. de Cuv., Ins. pl. 1. f. 2, expl. Ins. p. 5.

East Indies (*S. Stevens*). B.M.

14. SPHÆROTHERIUM KUTORGÆ.

Sphærotherium kutorgæ, Brandt, Bull. St. Pétersb. p. 560 (1841).

"Dorsal segments of the body without punctuations; collar wanting punctuations on its upper surface and on its anterior margin; small transverse rugosities placed on upper surface of the lateral wings of first dorsal segment slightly developed; terminated above by a curved line or little curved crest; last segment of the body slightly elevated, rather more projecting longitudinally at its centre."

Hab. unknown. Museum of St. Petersburg.

This species may perhaps belong to the *S. titanus* group.

15. Sphærotherium hippocastanum.

Zephronia hippocastanum, Gervais, Hist. Nat. des Insectes, Aptères, iv. p. 83 (1847).

? *Zephronia actæon*, White, Ann. & Mag. Nat. Hist. ser. 3, vol. iii. p. 405. n. 1, pl. 7. f. 5, 5*a*, 5*b* (1859), type.

Madagascar (*Madame Ida Pfeiffer*). B.M.

The differences which Mr. White gives to distinguish his species from *S. hippocastanum* are not so great as between the different examples which we possess of some other species, and I much doubt its specific distinctness. Mr. W. W. Saunders has an example measuring nearly 3 inches in length, and 1 inch 8 lines in breadth; this specimen has yellow eyes, whereas both *S. hippocastanum* and *S. actæon* are described with black eyes. I suspect the colour of the eyes, as well as of the segments of the body, varies considerably.

16. Sphærotherium latum.

Sphærotherium latum, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 358. n. 1, pl. 18. f. 3 (1872).

North Madagascar (*L. Bouton*). Type, B.M.

17. Sphærotherium klugii.

Sphærotherium klugii, Brandt, Bull. Acad. St. Pétersb. p. 360 (1841).

"Head entirely covered with punctuations. Collar provided on its front margin with a series of points, without punctuations at its centre and behind. First dorsal segment strongly punctured in front, slightly at its centre, and not at all behind. The others up to the last strongly marked in front and at the middle by very large punctures, smooth at their hind margin. Segments 6 to 11 somewhat sloping at their hind margin. The last segment entirely punctured, including its hind margin. The colour appears to be dark olivaceous, with the posterior margin of the segments ferruginous."

Cape of Good Hope. Museum St. Petersburg.

18. Sphærotherium convexum.

Sphærotherium convexum, Koch, Myriapoden, i. p. 31, pl. 14. f. 27 (1863).

New Holland (*Koch*).

19. Sphærotherium elongatum.

Sphærotherium elongatum, Brandt, Bull. Nat. de Mosc. vi. p. 199. n. 5 (1833); Koch, Myriapoden, i. pl. 14. f. 28 (1863).

Zephronia elongata, Gervais, Ann. Sc. Nat. 2nd ser. vii. p. 43 (1837).

Cape of Good Hope. Coll. W. W. Saunders.

20. SPHÆROTHERIUM DE LACYI.

Zephronia (Sphærotherium) de lacyi, White, Ann. & Mag. Nat. Hist. ser. 3, vol. iii. p. 406. n. 4, pl. 7. f. 2, 2*a* (1859).

New Zealand (*Macgillivray*). Type, B.M.

21. SPHÆROTHERIUM NEPTUNUS.

Sphærotherium neptunus, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 358. n. 2, pl. 18. f. 6 (1872).

Madagascar (*Madame Ida Pfeiffer*); Natal (*Gueinzius*). Type, B.M.

Sect. *d. Dorsal segments covered with minute pustules.*

22. SPHÆROTHERIUM FRATERNUM. (Plate XIX. fig. 2.)

Sphærotherium fraternum, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 359. n. 3 (1872).

Victoria, Australia (*Dr. Howitt*). Type, B.M.

Sect. *e. Lateral wings of first dorsal segment with laminæ broad and thin, marginal ridge feebly developed; dorsal segments without pustules.*

23. SPHÆROTHERIUM KOCHII, n. sp.

Sphærotherium punctatum, Koch, Myriapoden, i. p. 43, pl. 19. f. 37 (1863), but not of Brandt.

Java. B.M.

Koch says that the head and nuchal plate are somewhat darker than the dorsal segments: this is markedly the case in our example.

24. SPHÆROTHERIUM MICROSTICTUM.

Sphærotherium microstictum, Brandt, Bull. Acad. St. Pétersb. (1841); Rec. Mém. Myriap. p. 178 (1841).

"Head smooth, marked by scattered punctures, scarcely any on its upper margin. Collar punctured in front only, with punctuations in a row, without punctuations above; some scattered punctures upon the first dorsal segment. Second, third, fourth, and fifth segments finely punctured in front only, very nearly smooth over all the rest of their surface;" remaining segments, "with the exception of the last, punctured in front and in the centre. Hind margin of the last segment very nearly straight; this segment rounded, convex, moderately sloping, entirely marked with fine and close punctuations. Colour olivaceous; margins of the segments ferruginous."

Cape of Good Hope (*Brandt*); sp. ead.? hab. —? B.M.

We have portions of two large examples, differing much in depth of colour, but both apparently referable to this species.

Div. 4. *Last dorsal segment bearing a triangular excrescence in the middle of its posterior area.*

25. SPHÆROTHERIUM TITANUS.

Sphærotherium titanus, Brandt, Bull. Acad. St. Pétersb. (1840).

Hab. unknown. Museum of St. Petersburg.

26. Sphærotherium stigmaticum, n. sp. (Plate XIX. fig. 3.)

Dull testaceous; eyes, antennæ, and legs greenish olivaceous. Head smooth, shining in front and coarsely punctured, deeply sinuated behind; nuchal plate smooth, with central area slightly projecting and forming a double oval; dorsal segments depressed, smooth, scarcely perceptibly punctured behind, their lateral wings finely but densely punctured; last segment finely rugose, shining behind, somewhat compressed at the sides; its posterior margin somewhat projecting, and just above it a well-marked subtriangular raised spot.

Length 1 inch 4 lines, width 9 lines.

Madagascar. Two examples. Coll. Saunders.

Evidently allied to *S. titanus*, but having the dull aspect of *Zephronia innominata*.

The following species are of doubtful location:—

27. Sphærotherium ovale.

Julus ovalis, Linnæus, Amœn. Acad. iv. p. 253. n. 36, pl. 3. f. 4 (1788).

Julus ovatus, Fabricius, Sp. Ins. i. p. 528. n. 1.

China.

This species, unless the type turns up, will never be identified with certainty. It appears to be a narrow species, probably not unlike *Zephronia innominata* in form.

28. Sphærotherium gronovii.

Sphærotherium gronovii, Brandt, Rec. Mém. Myriap. p. 180.

Oniscus cauda subrotundata, &c., Gronov. Zooph. p. 233. n. 995, pl. 17. f. 4, 5 (1764).

Julus ovalis, Latreille, Hist. Nat. des Crust. et Ins. vii. p. 64. n. 1, pl. 59. f. 5, 6.

"Seas of Norway and England" (*Gronov*).

But for the antennæ, which are those of a *Sphærotherium*, this might have been identified with *Zephronia chitonoides*. It is probably allied to *S. neptunus*.

Genus Zephronia, Gray.

Div. 1. *Species with teeth on back of head.*

1. Zephronia brandtii.

Sphæropœus brandtii, Humbert, Myr. de Ceylan, in Mém. de la Soc. Phys. et d'Hist. Nat. de Genève, xviii. pt. i. p. 38, [*Zephronia b.*] pl. 3. f. 15 (1865).

Ceylon (*Thwaites & Purdie*). B.M.

2. Zephronia chitonoides.

Zephronia chitonoides, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 354. n. 1, pl. 18. f. 2, 2*a* (1872).

Madras and Ceylon (*Sir A. Smith*). Type, B.M.

3. Zephronia rugulosa.

Zephronia rugulosa, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 355. n. 2, pl. 18. f. 1 (1872).

Ceylon (*R. Templeton*). Type, B.M.

4. Zephronia noticeps. (Plate XIX. fig. 4.)

Zephronia noticeps, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 355. n. 3 (1872).

Ceylon (*E. W. Janson*). Type, B.M.

Div. 2. *Species without teeth on back of head.*

Sect. *a*. *First dorsal segment with lamina of lateral wing narrow; lateral marginal ridge feebly developed.*

5. Zephronia testacea.

Julus testaceus, Olivier, Enc. Méth., Ins. vii. p. 414.

Zephronia testacea, Gervais, Ann. Sc. Nat. 2nd ser. vii. p. 43 (1837).

Sphærotherium testaceum, Brandt, Rec. Mém. Myriap. p. 181 (1841).

Madagascar; sp. ead.? hab. —? B.M.

6. Zephronia nigrinota.

Zephronia nigrinota, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 356. n. 8, pl. 18. f. 9 (1872).

Sikkim (*Dr. Hooker*); Assam (*Warwick*), Type, B.M.

7. Zephronia heterosticta.

Zephronia heterosticta, Newport, Ann. & Mag. Nat. Hist. ser. 1, vol. xiii. p. 265 (1844).

India (*W. Elliot*). Type, B.M.

8. Zephronia inermis.

Sphæropœus inermis, Humbert, Myr. de Ceylan, in Mém. de la Soc. Phys. et d'Hist. Nat. de Genève, xviii. pt. 1, p. 39, [*Zephronia i.*] pl. 3. f. 16 (1865).

Ceylon (*R. Templeton*); Madras (*Sir A. Smith*). B.M.

Group *aa*. *Front of head hairy.*

9. Zephronia glabrata.

Zephronia glabrata, Newport, Ann. & Mag. Nat. Hist. ser. 1, vol. xiii. p. 264 (1844).

Philippine Islands. Type, B.M.

Group *ab*. *Head and nuchal plate hairy.*

10. Zephronia lutescens. (Plate XIX. fig. 5.)

Zephronia lutescens, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 356. n. 9 (1872).

India (*Mrs. Hamilton*). Type, B.M.

Allied to the preceding, but with head, nuchal plate, and front of first dorsal segment setose; the nuchal plate and dorsal segments comparatively broader and much less punctured.

Group *ac.* *All the body hairy.*

11. Zephronia ignobilis. (Plate XIX. fig. 6.)

Zephronia ignobilis, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 357. n. 10 (1872).
Java (*Argent*). Type, B.M.

12. Zephronia pilifera. (Plate XIX. fig. 7.)

Zephronia pilifera, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 357. n. 11 (1872).
Ceylon (*R. Templeton*). Type, B.M.

Sect. *b. First dorsal segment with lamina of lateral wing broad; lateral marginal ridge feebly developed.*

13. Zephronia corrugata. (Plate XIX. fig. 8.)

Zephronia corrugata, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 355. n. 4 (1872).
Ceylon (*R. Templeton*). Type, B.M.

14. Zephronia hercules.

Sphæropœus hercules, Brandt, Bull. Nat. Mosc. vi. p. 200. n. 1 (1833); Koch, Myriapoden, p. 31, pl. 2. f. 4 (1863).
Hab. ——? Berlin Museum (*Koch*).
This species is remarkable for the peculiar elongation of the lateral wings of first segment.

15. Zephronia ovalis.

Zephronia ovalis, J. E. Gray in Griffith's Animal Kingdom, Ins. pl. 135. f. 5 (not *Julus ovalis*, Linn.).
Sphæropœus insignis, Brandt, Bull. Nat. Mosc. vi. p. 200. n. 2 (1833).
Java (*Argent*). Type, B.M.
M. Gervais seems to have doubted whether this was a *Sphærotherium* or a *Zephronia*. He first quoted it as synonymous with *S. javanicum*, and subsequently as a distinct species under the name of *Z. insignis* (see 'Aptères,' pp. 82 & 85).

16. Zephronia tigrina.

Zephronia tigrina, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 356. n. 6, pl. 18. f. 7 (1872).
"East Indies" (*S. Stevens*). Type, B.M.

17. Zephronia zebraica.

Zephronia zebraica, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 356. n. 7, pl. 18. f. 4 (1872).
Near Bombay (*Col. Whitehill*). Type, B.M.

18. Zephronia banksiana, n. sp. (Plate XIX. fig. 9.)

Dorsal segments, excepting the first, palish chestnut, spotted and blotched with pitchy; head, nuchal plate, and first segment dark chestnut, more or less varied with black; eyes pale greenish.

Head shining, densely but finely punctured in front; nuchal plate with anterior ridge and row of ill-defined punctures; folded anterior ridge of first dorsal segment unusually thick, lateral wing broad, with feebly developed ridge; dorsal segments for the most part smooth and polished, but with their front edge and anterior half of lateral wings somewhat rugose; anterior half of last segment finely and densely punctured.

Length 2 inches, width 1 inch.

Hab. unknown. Coll. Banks in B.M.

Allied to *Z. sulcatula* and *Z. zebraica.*

19. Zephronia versicolor.

Zephronia versicolor, White, Ann. & Mag. Nat. Hist. ser. 3, vol. iii. p. 405. n. 3, pl. 7. f. 3, 3*a*, 3*b* (1859); Humbert, Myr. de Ceylan, in Mém. de la Soc. Phys. et d'Hist. Nat. de Genève, xviii. pt. 1, p. 41, pl. 3. f. 17 (1865).

Peradenia, Ceylon (*Thwaites*). Three specimens. Type, B.M.

Group *ba*. *Head and nuchal plate hairy.*

20. Zephronia leopardina. (Plate XIX. fig. 10.)

Zephronia leopardina, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 356. n. 5 (1872).

Ceylon (*R. Templeton*). Type, B.M.

My observation respecting the hairiness of this *Zephronia* was to some extent erroneous, the real hairs being confined to the head and nuchal plate. A microscopical examination of the dorsal segments shows them to be to all appearance merely dirty.

Group *bb*. *All the body hairy.*

21. Zephronia castanea.

Zephronia castanea, Newport, Ann. & Mag. Nat. Hist. ser. 1, vol. xiii. p. 265 (1844).

Philippine Islands (*Cuming*). Type, B.M.

Group *bc*. *A narrow projecting (but not shining) interrupted longitudinal ridge from first to last segment (neither included).*

22. Zephronia innominata.

Zephronia innominata (Newport), Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 357. n. 12, pl. 18. f. 8 (1872).

Philippine Islands (*Cuming*). Type, B.M.

May at once be distinguished from *Z. castanea* by its paler colour, narrower and more distinctly punctured dorsal segments, longitudinal ridge, and broader terminal joint of antennæ.

Sect. c. *Lamina of lateral wing broad, marginal ridge feebly developed; second to eleventh dorsal segments multisulcate.*

23. Zephronia sulcatula.

Zephronia sulcatula, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. x. p. 357. n. 13, pl. 18. f. 5 (1872).

Borneo (*W. Jeakes*). Type, B.M.

EXPLANATION OF PLATE XIX.

Fig. 1. *Sphærotherium glabrum*, profile.
1 *a*. —— ——, anterior segments from above.
2. —— *fraternum*, profile.
3. —— *stigmaticum*, perspective view from behind.
4. *Zephronia noticeps*, head, nuchal plate, and anterior segments, enlarged; front view.
5. —— *lutescens*, profile.
6. —— *ignobilis*, profile, enlarged.
7. —— *pilifera*, profile.
8. —— *corrugata*, profile.
9. —— *banksiana*, profile.
10. —— *leopardina*, profile.

5. Descriptions of Eight new Species of Land and Marine Shells from various Localities. By George French Angas, Corr. Mem. Z.S., F.R.G.S., F.L.S., &c.

[Received December 16, 1872.]

(Plate XX.)

1. Euthria aracanensis, n. sp. (Plate XX. fig. 1.)

Shell ovately fusiform, solid, transversely ridged, the interstices finely transversely striate, the ridges stronger in front, pale olivaceous brown, ornamented with longitudinal irregular chestnut markings; whorls 9 to 10, strongly angulate and nodose in the middle, excavated above, and slightly rounded below; aperture ovate, nearly half the length of the shell, angulate posteriorly, pale flesh-colour; outer lip crenulate, finely sulcate within; columella strongly arcuate, with a moderate posterior callus; the rostrum slanting, recurved.

Length 2 inches, diam. 1 inch (*coll. Hanley*).

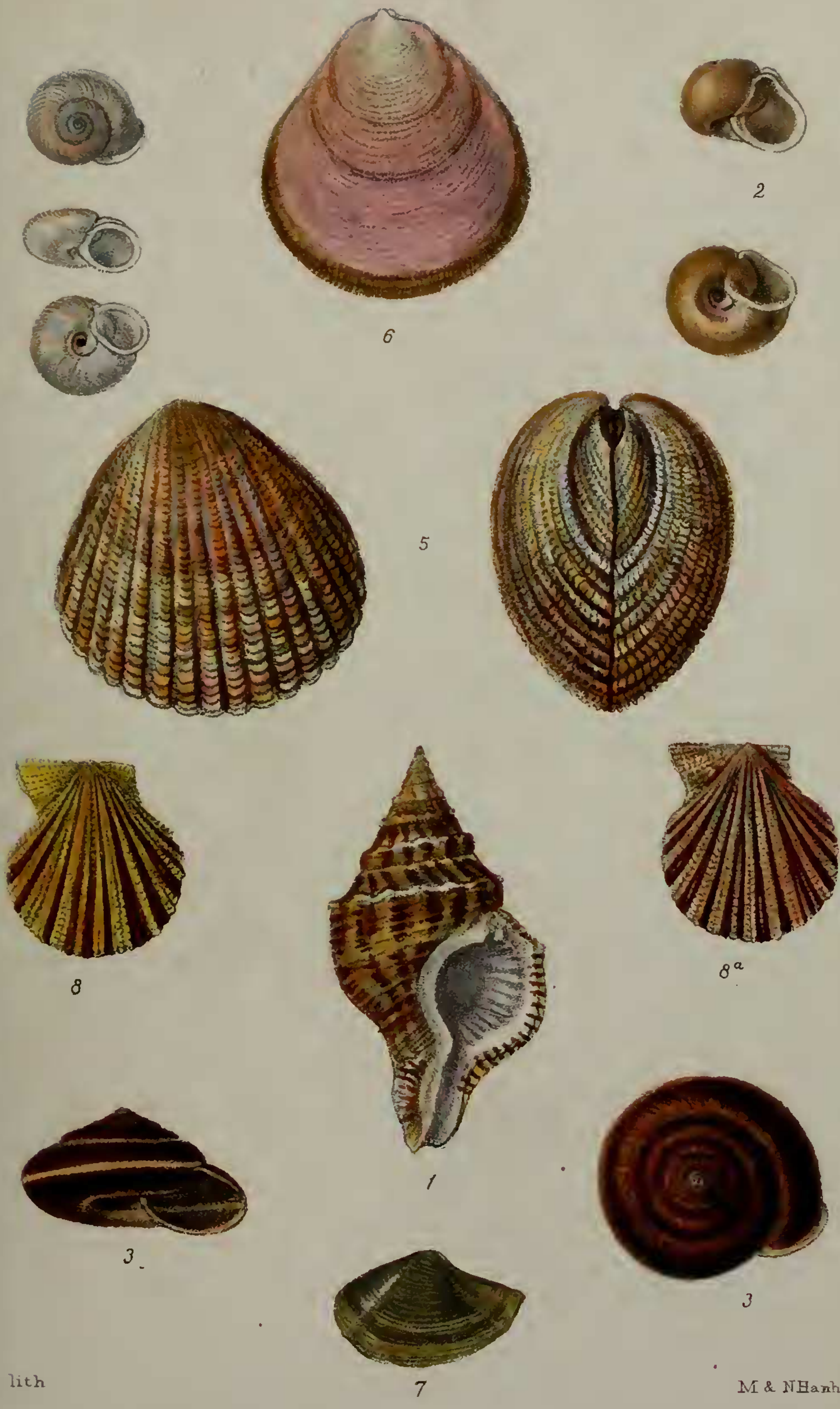
Hab. Aracan.

2. Helix (Semicornu) silenus, n. sp. (Plate XX. fig. 2.)

Shell deeply and perspectively umbilicated, rather thin, globosely depressed, pale brown, minutely and very finely punctately striate; spire immersed; whorls 5, rounded, rapidly increasing, the last inflated, a little flattened at the upper part, descending considerably in front, and somewhat angulated round the umbilicus; aperture oblique, rhomboidly lunate; peristome thin, whitish; margins approximating, the right flexuous, narrowly expanded; the columellar margin rounded, expanded, and slightly reflexed.

Maj. diam. 7, min. 6; height 5 lines.

Hab. New Ireland.



Sowerby lith

M & N Hanhart. imp.

NEW LAND & MARINE SHELLS.

3. Helix (Trochomorpha) juanita, n. sp. (Plate XX. fig. 3.)

Shell widely and deeply umbilicated, depressedly conoidal, moderately thin, shining, obliquely sculptured with irregular close raised striæ, dark chestnut-brown, with a narrow yellowish-green band at the periphery and a broad band of the same colour surrounding and including the umbilicus; spire convexly conoidal; whorls $6\frac{1}{2}$, slightly convex, the last angled at the periphery; aperture oblique, truncately oval; peristome white, the margins thin, converging, slightly expanded, the right somewhat flexuous, the basal a little thickened.

Maj. diam. 12, min. 11; height $6\frac{1}{2}$ lines.

Hab. Solomon Isles.

4. Helix (Angasella) phillipsiana, n. sp. (Plate XX. fig. 4.)

Shell deeply umbilicated, depressed, rather thin, obliquely plicately striated and finely granulated, brownish white; spire slightly raised; whorls $4\frac{1}{2}$, convex, the last rounded, descending in front, a little constricted behind the lip; aperture diagonal, subcircular; peristome nearly continuous, expanded, and slightly reflexed, the margins united by a thick callus.

Maj. diam. $6\frac{1}{2}$, min. diam. $5\frac{1}{2}$; alt. $3\frac{1}{2}$ lines.

Hab. Neighbourhood of Arrowie, interior of South Australia.

This species is related to *H. cyrtopleura*, Pfr., from the same locality; but it is smaller, has a narrower umbilicus, is less discoidal, and the surface is granular, besides being plicately sculptured.

5. Pectunculus gealei, n. sp. (Plate XX. fig. 5.)

Shell solid, triangularly ovate, ventricose, equilateral, pale yellowish brown, mottled here and there with reddish brown; valves radiately and strongly ribbed; ribs rounded, transversely striate, and towards the base imbricately nodulous, the interstices excavated and transversely striated; umboes central, tumid, and a little incurved; cardinal area deep and somewhat triangular; posterior side rather straight; anterior side subangulate, with a distinct lunular area, on which the sculptured ribs are smaller and less prominent; ventral margin strongly arcuate, dentate within; posterior adductor scar supported by a prominent thickened callosity; interior white.

Long. 18, alt. 18, lat. 14 lines.

Hab. Dredged off Port Macquarie, New South Wales.

This remarkable shell bears a strong external resemblance to certain species of *Cardium*, owing to the imbricately nodulous character of the ribs, and to its possessing a defined lunular area.

6. Limopsis loringi, n. sp. (Plate XX. fig. 6.)

Shell very solid, triangularly orbicular, equilateral, somewhat tumid, white, more or less tinged with rose-colour; valves concentrically ridged, the ridges closely striate, furnished next the margins with a pale brown epidermis projecting in a fringe beyond them; umboes central, prominent, and approximating; dorsal margin on either side nearly straight; ventral margin rounded; cardinal denticles ten on each side; internal margin not crenulate.

Long. 15, alt. 16, lat. 8 lines.

Hab. Dredged off the coast of Queensland.

Myochama stutchburyi, A. Ad., is parasitic upon this fine species.

7. LEDA HANLEYI, n. sp. (Plate XX. fig. 7.)

Shell triangularly ovate, subequilateral, ventricose, moderately solid, concentrically sulcate, shining, covered with a pale olivaceous epidermis; the anterior area furnished with an oblique ridge extending from the umboes to the ventral margin; the posterior area with a radiating, shallow, but wide, impression; the anterior dorsal margin a little incurved and excavated; the posterior one almost straight; the anterior extremity rostrate and slightly truncate; the posterior rounded; the ventral margin arcuate; umboes tumid, incurved, approximate; internal margin simple.

Long. 11, alt. $6\frac{1}{2}$, lat. $4\frac{1}{2}$ lines.

Hab. Australian Seas.

8. PECTEN FORMOSUS, n. sp. (Plate XX. fig. 8.)

Shell rotundately ovate, rather thin, moderately convex, equilateral, equivalve, yellow or flesh-colour, ornamented with about ten purple rays; the valves sculptured with about forty unequal radiating ribs, the ribs armed with short erect scale-like spines; ligamental margin transverse; ears very unequal, and furnished with numerous radiating squamose ribs; byssal sinus large.

Long. 10, alt. 10, lat. 4 lines.

Hab. ? Fiji Islands.

EXPLANATION OF PLATE XX.

Fig. 1. *Euthria araeanensis*, p. 182.
2. *Helix* (*Semicornu*) *silenus*, p. 182.
3. —— (*Trochomorpha*) *juanita*, p. 183.
4. —— (*Angasella*) *phillipsiana*, p. 183.
5. *Pectunculus gealei*, p. 183.
6. *Limopsis loringi*, p. 183.
7. *Leda hanleyi*, p. 184.
8, 8 *a*. *Pecten formosus*, p. 184.

6. On Peruvian Birds collected by Mr. Whitely. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.Z.S. Part VI.*

[Received December 17, 1872.]

(Plate XXI.)

The present collection of birds, containing about 130 skins referable to 80 species, was formed by Mr. Whitely chiefly at Cosnipata, the same locality as that in which his last collection was made†, in

* Continued from P. Z. S. 1869, pp. 596–601.
† See P. Z. S. 1869, p. 597.